

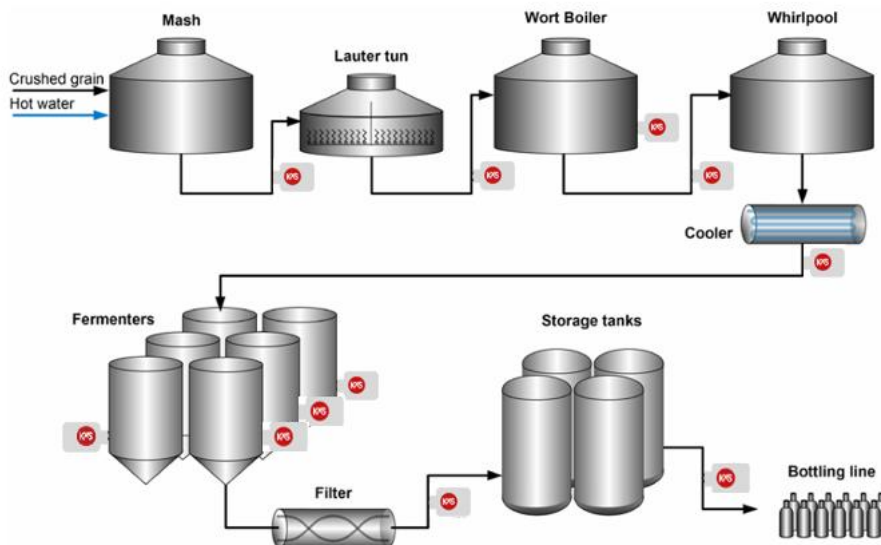


Overview of beer brewing process

Monitoring of wort, sugar-to-alcohol, final beer, CIP

Benefits of R.I. measurement

- Optimizes brewing efficiency by ensuring accurate wort concentration and fermentation control.
- Provides real-time monitoring, reducing manual sampling and improving process efficiency.
- Enhances product consistency, ensuring repeatability across batches.
- Supports sustainability, minimizing water waste during lautering and rinsing.
- Enables automation, integrating seamlessly with brewery control systems.



Overview

The first step in the beer brewing process is the preparation of malt grains. The extract received from this raw material is called *wort*. The second step is fermentation by yeast, followed by conditioning and final filtration. After filtration, the beer is ready for bottling.

Throughout the brewing process, real-time monitoring of the concentration of dissolved solids is essential for ensuring quality, optimizing production, and reducing waste.

Refractive index measurement applications

1. Mash tank

Mashing is the process of mixing crushed malt with hot water to activate enzymes that convert starches into fermentable sugars. The KxS DCM-20 measures the concentration of the mash at the outlet pipe to maintain a consistent composition.

Benefits:

- Ensures optimal sugar conversion efficiency.
- Real-time monitoring reduces sampling errors and improves consistency.

Automatic prism wash with steam or high-pressure hot water recommended

2. Lauter tun

The lauter tun separates the extracted wort from the spent grain. Water rinsing is used to maximize wort extraction while minimizing excessive dilution. The KxS DCM-20 detects the shut-off point for rinsing, preventing unnecessary water use.

Benefits:

- Optimizes yield by detecting the decreasing concentration of extractable sugars.
- Reduces excess water usage and improves sustainability.

Automatic prism wash recommended.

3. Wort boiler

In the wort boiler, the wort is pasteurized, and its flavor profile is adjusted by adding hops or other ingredients. The KxS DCM-20 continuously measures the wort's strength/gravity to ensure optimal boiling time and consistency.

Benefits:

- Eliminates the need for manual sampling.
- Provides instant feedback for process optimization.
- Ensures consistent wort quality for every batch.

4. Hot wort from boiler to whirlpool

Before fermentation, solids are separated from the wort using a whirlpool. The KxS DCM-20 monitors wort quality at the boiler outlet to ensure proper separation efficiency.

Benefits:

- Ensures optimal separation of hop residues and unwanted solids.
- Reduces production inconsistencies and waste.

5. Chilled wort from heat exchanger

After boiling, the wort is cooled to fermentation temperature. The KxS DCM-20 provides real-time quality control for the chilled wort before it enters fermentation. This is an alternative measurement to point 4.

6. Fermentation

During fermentation, yeast converts sugars into alcohol and CO₂. The KxS DCM-20 continuously monitors the refractive index, detecting changes in sugar content and conversion rates into alcohol.

Benefits:

- Allows precise control of the fermentation process.
- Provides indirect measurement of alcohol volume (%).
- Helps determine the fermentation endpoint accurately.



7. Filtration and quality control

After fermentation, the beer undergoes filtration to remove suspended yeast and other solids. The KxS DCM-20 ensures proper quality control for wort filtering output.

Benefits:

- Ensures consistent product clarity.
- Reduces product losses during filtration.

8. Bottling and interface detection

Beer is bottled or canned using a filling machine. If the same line is used for different products, a Clean-In-Place (CIP) process is required. The KxS DCM-20 detects product-to-product and product-to-CIP cleaning interfaces in real time.

Benefits:

- Prevents cross-contamination between products.
- Improves production efficiency and reduces downtime.
- Ensures correct product-to-bottle selection.

Instrumentation and installation considerations

The KxS DCM-20 Process Refractometer is used at multiple stages of the brewing process to provide real-time, accurate measurements of dissolved solids. The refractometer uses an optical measurement of the refractive index and can be calibrated in Plato, Brix, Balling, gravity, or density, depending on the brewery's preference.

Food safety and hygienic design

To ensure absolute food safety, every wetted part of the KxS DCM-20—including the sensor, flow cell, and process connection — is certified for safe food contact and full traceability. These critical components are designed and documented to meet the highest industry standards:

All wetted parts of the KxS DCM-20 refractometer, including sensor, flow cells, and process connections are with 3A Sanitary Symbol authorization and holds EHEDG certification, ensuring compliance with the highest industry standards for hygienic design, cleanability, and CIP/SIP suitability.